

ADDITIONAL NOTES ON THE GENUS *TEIJSMANNIODENDRON*. I

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TEIJSMANNIODENDRON NOVO-GUINEENSE (Kaneh. & Hatus.) Kosterm.

Additional bibliography: Mold., *Phytologia* 46: 467 & 494. 1980.

Additional synonymy: *Teijsmanniodendron novoguineense* (Kaneh. & Hatus.) Kosterm., *Reinwardtia* 1: 103. 1951. *Vitex novoguineënsis* Kaneh. & Hatus. apud E. J. Salisb., *Ind. Kew. Suppl.* 11: 265. 1953. *Vitex novoguineënsis* Kaneh. & Hatus. ex G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959. *Teijsmanniodendron novoguineënsis* (Kaneh. & Hatus.) Hosterm. apud G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959.

Bibliography: Kaneh. & Hatus., *Bot. Mag. Tokyo* 56: 116--117, fig. 8. 1942; Kosterm., *Reinwardtia* 1: 75, 79, 80, 103, & 106. 1951; E. J. Salisb., *Ind. Kew. Suppl.* 11: 265. 1953; Mold., *Résu-mé* 202, 387, & 470. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959; Mold., *Fifth Summ.* 1: 337 & 339 (1971) and 2: 724 & 911. 1971; Mold., *Phytologia* 44: 222. 1979.

Illustrations: Kaneh. & Hatus., *Bot. Mag. Tokyo* 56: 117, fig. 8. 1942.

Collectors describe this species as a tree, to about 25 m. tall, the bole clear to 18 m. high, with a diameter of 90 cm. at breast height, the branchlets slender, buttresses indistinct, up to 1 m. high, the bark rough, with numerous prominent lentils, the wood yellowish, the leaflets dark-green above, light-green beneath, thin-coriaceous, without impressed dots beneath, the secondaries 5 or 6 pairs, obliquely spreading, slightly curvate, marginally not anastomosing, the inflorescences much more slender than those of *T. hollrungii*, the corollas light-purple, the lip darker purple or lilac, with an orange dot at the throat, the anthers purple, and the immature fruit light-green.

The species is based on *Kanehira & Hatusima 12578* from Ayer-jat, near Nabire, on Geelvink Bay, West Irian, New Guinea. It has been collected in lowland forests, at an altitude of 100 m., in anthesis in September. A vernacular name, "prau", has been reported for it.

Kostermans (1951) says that the species is "very close to *T. hollrungii* (Warb.) Kosterm., but can easily be distinguished from the latter by the absence of the numerous holes (glands) of the lower leaf-surface and by the fewer lateral nerves. In addition the leaves are less rigid....[It] seems to be rather rare." He notes that the *Thomson s.n.*, which he cites from West Irian, "differs from the type in its larger, paniculate inflorescence (20--30 cm) which is densely tomentose (more laxly so on the peduncles), and the larger flowers. I consider it, however, conspecific, as the leaves are identical and the type has a poorly developed in-

florescence, which even shows the same pubescence in some parts; calyx and corolla are of the same shape, the ovary in both species [sic; =specimens] has the same indumentum." He notes also that "The species comes close to *Vitex cofassus*, from which it differs by the few lateral nerves, the indumentum of the inflorescences, and lack of tiny holes in the lower leaf surface."

It is of more than passing interest to note that Van Leeuwen describes his no. 11131 as having been taken from a "liana" -- surely an error in observation!

Citations: NEW GUINEA: West Irian: *Kanehira & Hatusima 12578* (Bz--73233--isotype, N--photo of isotype, Z--photo of isotype); *Thomson 866* (Bz--73234, N); *Van Leeuwen 11131* (Bz--72697, N), 11260 (Bz--72696). NEW GUINEAN ISLANDS: Waigeo: *Van Royen 5463* (Ca--1341515).

TEIJSMANNIODENDRON PENDULUM Kosterm., *Reinwardtia* 5: 352--353 & 369, fig. 14. 1960.

Synonymy: *Teysmanniodendron pendulum* Kosterm. ex Kramer, *Excerpt. Bot. A.5*: 33. 1962.

Bibliography: Kosterm., *Reinwardtia* 5: 352--352 & 369, fig. 14. 1960; Kramer, *Excerpt. Bot. A.5*: 33. 1962; G. Taylor, *Ind. Kew. Suppl.* 13: 134. 1966; *Mold.*, *Fifth Summ.* 1: 328 (1971) and 2: 911. 1971; *Mold.*, *Phytologia* 46: 483 & 486. 1980.

Illustrations: Kosterm., *Reinwardtia* 5: 369, fig. 14. 1960.

A medium-sized tree, to 15 m. tall; clear bole to 9 m. high, 30 cm. in diameter at breast height, girth to 60 cm; outer bark thin, smooth, whitish or brown; inner bark yellow; living bark about 15 mm. thick, red-brown, brittle; wood light-brown, rather soft; leaves 3-foliolate; petioles slender, to 5 cm. long, glabrous, basally incrassate; petiolules slender, 1--1.5 cm. long, basally incrassate; leaflet-blades rigidly chartaceous, elliptic-lanceolate or lanceolate, 5--18 cm. long, 1.5--4 cm. wide, apically acuminate, marginally entire, basally broadly cuneate or acute, glabrous, plainly reticulate-veined on both surfaces, dark-green above and dull pale-green beneath when fresh, somewhat glaucous beneath when dry; midrib prominent beneath; secondaries 3--6 pairs, arcuately ascending, prominent beneath; veinlet reticulation "marked in grey with microscopical dark dots"; inflorescence apical (terminal), usually simple and unbranched or apically few-branched (the branches very short), to 5 cm. long in fruit, with thickened nodes and bract-scars; fruiting-calyx rounded-patelliform, incrassate, 5-lobed, the lobes about 5 mm. long; fruit (immature?) green, subglobose, about 2 cm. long and wide, glabrous, solitary, pendulous; cotyledons when young jelly-like.

The species is based on *Kostermans 13007* from Palimasen, near Tabang, at 500 m. altitude, West Kutei in the Belajan River region, Kalimantan, Borneo, deposited in the Buitenzorg (Java) herbarium.

The above description is taken in major part from Kosterman (1960). The corollas are said to have been "white to purplish" on *Talip SAN.65886*. The species has been found growing in yel-

lowish-brown soil in primary forests on hillsides, in *Agathis* forests, and in waterlogged loam soil intercalated between acid sandy soil, in anthesis in July and in fruit in September.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Kostermans 13007* (Ba, N). Sabah: *Talip SAN.65886* (N, Z).

TEIJSMANNIODENDRON PETELOTI Mold., *Lloydia* 13: 225. 1950.

Bibliography: Mold., *Lloydia* 13: 225. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 250. 1953; Mold., *Résumé* 177 & 470. 1959; Mold., *Fifth Summ.* 1: 303 (1971) and 2: 911. 1971; Mold., *Phytologia* 46: 467. 1980.

A tree, to 10 m. tall; branchlets and twigs rather slender, grayish-brown, obtusely tetragonal, the youngest parts often sulcate, glabrous, the bark apparently wrinkling and exfoliating in drying; nodes annulate, somewhat swollen; principal internodes 2.5--7.5 cm. long; leaves decussate-opposite, 1-foliolate; petioles slender, 5--10 mm. long, canaliculate above, glabrous; leaflet-blades chartaceous, uniformly dark-green on both surfaces or slightly lighter beneath, elliptic or elliptic-obovate, 7.5--14.5 cm. long, 2.5--6 cm. wide, apically acuminate, marginally entire, basally attenuate-acuminate into the petiole, glabrous and very shiny on both surfaces; midrib slender, flat above, prominent beneath; secondaries slender, 9--12 per side, flat above, prominulous beneath, beautifully and regularly arcuate-ascending, not anastomosing but terminating at the margins which they subparallel for a short distance; veinlet reticulation very abundant, conspicuous, plane or very slightly prominulous above, prominulous beneath, with numerous subparallel tertiaries; inflorescence axillary, much shorter than the subtending leaves, cymose, usually 4-flowered, mostly about 4 cm. long in all; peduncles filiform, about 2 cm. long, nigrescent, glabrous; bracts absent; bractlets setaceous, minute; pedicels filiform, 3--7 mm. long, nigrescent, glabrous, flattened; calyx campanulate, nigrescent, 3--5 mm. long, 3--3.5 mm. wide, glabrous, its rim subtruncate, very shortly 5- or 6-apiculate-toothed; corolla white, hypocrateriform, its tube broadly infundibular, about 1 cm. long, apically about 7 mm. wide, externally densely cinereous-puberulent with microscopic hairs, the limb almost 1.5 cm. wide, 5-lobed, the lobes about 5 mm. long, apically acute; stamens 4, didynamous, included; pistil included, glabrous; style glabrous; stigma deeply bifid.

This species is based on *Pételot 6801* from an open forest, at about 500 m. altitude, on Mount Bavi, Santây province, Tonkin, North Vietnam, collected on April 16, 1941, and deposited in the Britton Herbarium at the New York Botanical Garden. At present it is known to me only from the original collection.

Citations: VIETNAM: Tonkin: *Pételot 6801* (N--type).

TEIJSMANNIODENDRON PIERREI Mold., *Phytologia* 8: 273--274. 1962.

Bibliography: Mold., *Phytologia* 8: 273--274. 1962; Mold., *Biol. Abstr.* 39: 614. 1962; Hocking, *Excerpt. Bot. A.6:* 535. 1963; G. Taylor, Ind. Kew. Suppl. 14: 134. 1970; Mold., *Phytologia* 46: 467,

483, & 491. 1980.

A small tree, to about 12 m. tall; branches crowded, much twisted and tangled, glabrous, shiny; branchlets and twigs rather slender, obscurely subtetragonal or subterete, very pale gray, glabrous, very shiny; principal internodes much abbreviated, mostly only 1.5 cm. long or less; nodes not annulate; leaves decussate-opposite, 1-foliolate, numerous, rarely binary; petioles rather heavy, short, 10--15 mm. long, glabrous, shiny, apically and basally swollen, apically articulate; leaflet-blades coriaceous, uniformly dark-green on both surfaces, lanceolate, 3--13 cm. long, 1.1--4.8 cm. wide, smooth and very shiny on both surfaces, apically acute or short-acuminate, marginally entire, basally subacute; midrib slender, slightly prominent above, sharply prominent beneath; secondaries slender, about 10 per side, arcuate-ascending, mostly flat above, very slightly prominulous beneath, arcuately joined near the margins beneath; veinlet reticulation indiscernible above, mostly obscure beneath; infructescence apparently racemose and axillary, perhaps also terminal and subpaniculate, rather few-fruited, apparently simple, 5--15 cm. long, the peduncle and rachis glabrous and shiny; fruiting pedicels heavy, about 5 mm. long, glabrous; fruiting-calyx cupuliform, to 7 mm. long and 15 mm. wide, heavy, glabrate, the rim entire or subentire; fruit not known.

The species is based on *Pierre 37* from Baria, in the Dinh mountains, southern Cochinchina, South Vietnam, collected in March of 1867, and deposited in the Britton Herbarium at the New York Botanical Garden. The collector reports the vernacular Annamese names as "com tao" and "kum tao" and describes the corolla as "blue". The type specimen is flowerless. Dop regarded the type as *Vitex holophylla* Baker and material has been distributed in many herbaria under that name. It has also been misidentified as *Teijsmanniodendron coriaceum* (C. B. Clarke) Kosterm., *T. hollrungii* (Warb.) Kosterm., *T. sarawakanum* (H. H. W. Pearson) Kosterm., and *Vitex glabrata* R. Br.

Citations: VIETNAM: Cochinchina: *Pierre 37* (B--isotype, B--isotype, B--isotype, Bz--73091--isotype, Ca--38165--isotype, Ca--isotype, N--type, S--isotype).

TEIJSMANNIODENDRON PTEROPODUM (Miq.) Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 29--31 [as "*Teysmanniodendron*"]. 1921.

Synonymy: *Vitex pteropoda* Miq., Fl. Ind. Bat. Suppl. 1: 242 & 567. 1860. *Vitex philippinensis* Merr., Bull. Philip. Bur. For. 1: 52. 1903. *Vitex peralata* King, Kew Bull. Misc. Inf. 1908: 112. 1908. *Vitex koordersii* H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 64. 1921. *Teysmanniodendron pteropodum* (Miq.) Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 29. 1921. *Teysmanniodendron pteropodum* Bakh. apud Heyne, Nutt. Plant. Ned. Ind., ed. 2, 2: 1313. 1927. *Teijsmanniodendron pteropodum* (Miq.) H. Lam apud E. D. Merr., Univ. Calif. Publ. Bot. 15: 262. 1928. *Teijsmanniodendron pteropodum* Bakh. apud A. W. Hill, Ind. Kew. Suppl. 7: 238. 1929. *Vitex philippinensis* Merr. a-

pud Mold., Résumé 388, sphalm. 1959. *Vitex philippinensis* H. J. Lam ex Burkill, Dict. Econ. Prod. Malay Penins. 2: 2277. 1966. *Teijsmanniodendron pteropus* (Miq.) Lam, in herb.

Bibliography: Miq., Fl. Ind. Bat. Suppl. 1: 242 & 567. 1860; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1214. 1895; Greshoff, Meded. Lands Plant. 39: 128. 1900; E. D. Merr., Bull. Philip. For. Bur. 1: 52. 1903; King, Kew Bull. Misc. Inf. 1908: 112. 1908; Prain, Ind. Kew. Suppl. 3: 189. 1908; Gamble in King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 851. 1908; Prain, Ind. Kew. Suppl. 4, imp. 1, 248. 1913; Heyne, Nutt. Plant. Ned. Ind., ed. 1, 4: 124--125. 1917; H. J. Lam, Verbenac. Malay. Arch. 170--172, 214, & 370. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 29--31. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 398--399. 1923; Ridl., Fl. Malay Penins. 2: 633--634. 1923; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 2: 1313--1314. 1927; A. W. Hill, Ind. Kew. Suppl. 7: 238 & 252. 1929; E. D. Merr., Univ. Calif. Publ. Bot. 15: 262. 1929; Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1076 & 1077. 1932; Kloppenburg-Versteegh, Wenk. Raadgev. Betreff. Gebr. Ind. Pl., ed. 4, 15. 1934; Beer & Lam, Blumea 2: 228. 1936; Mold., Prelim. Alph. List Inv. Names 52. 1940; Mold., Suppl. List Comm. Vern. Names 14, 19, & 20. 1940; Mold., Phytologia 2: 114. 1944; Mold., Alph. List Inv. Names 54. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 61, 63, 65, 66, 74, 100, & 104. 1942; Jacks. in Hook f. & Jacks., Ind. Kew., imp. 2, 2: 1214. 1946; H. N. & A. L. Mold., Pl. Life 2: 67. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 139, 140, 142, 143, 145, 146, 148, 163, 196, & 202. 1949; Kosterm., Reinwardtia 1: 75, 77, 79, 92--94, & 106. 1951; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Mold., Résumé 181, 185, 187, 188, 192, 184, 198, 222, 353, 354, 384, 387, 388, & 470. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1214. 1960; Maun, Philip. Journ. Forest. 16: 108. 1960; Menninger, Flow. Trees World 26 & 285. 1962; Mold., Résumé Suppl. 10: 7. 1964; Burkill, Dict. Econ. Prod. Malay Penins. 2: 2277 & 2280. 1966; Uphof, Dict. Econ. Pl., ed. 2, 517. 1968; Mold., Résumé Suppl. 18: 14. 1969; Mold., Fifth Summ. 1: 306, 318, 328, 331, & 369 (1971) and 2: 640, 641, 719, 725, 726, 791, & 911. 1971; Altschul, Drugs Foods 245. 1973; Mold., Phytologia 44: 222, 223, & 473 (1979) and 46: 466, 477, 479, 483, & 486. 1980.

A rather tall, nearly glabrous tree, to 35 m. tall; trunk to 61 cm. in diameter at breast height, the clear bole to 20 m. high, to 2 m. in girth, with narrow buttresses to 4 m. high, merging gradually upwards into the bole as ridges; bark thin, smooth, warty-lenticellate, peeling off in small pieces, the dead outer bark very thin, whitish or gray to yellowish, brownish-green, or reddish, sometimes "dippled black and white", the inner bark yellow or yellowish to purplish-mottled, 1.2--1.5 cm. thick, often with a disagreeable odor; wood white or "dirty-white", hard or soft, sappy, the sapwood usually yellow, gradually merging into the dark-yellow heartwood, density of the sapwood 0.55--0.37 (average 0.49), not strong (class III/IV), not durable (class V); branches borne mainly at the top or, at least, above the middle,

terete, striate, thick and rigid, not much rebranched; branchlets thick, tetragonal, laterally canaliculate, eventually striate-costate, the bark gray or pale-brown; twigs thick, erect or ascending; leaves decussate-opposite, large, horizontally spreading, digitately 3--7-foliolate, diverse in size; petioles elongate, thick, 7--30 cm. long, triangular in cross-section, laterally compressed, glabrous, apically and basally pulvinate and basally broadly sulcate, more or less foliaceous-alate, the wind narrow or broad, usually basally ampliate and there broadly rounded-subcordate or even auriculate (f. *auriculatum*), apically gradually or abruptly acuminate, green and glabrous on both surfaces like the leaflets, usually wider basally than apically, irregularly venose, sometimes on young plants very broad and cristate and to 10 cm. wide on each side of the petiole (f. *cristatum*); petiolules 0.5--5 cm. long or almost obsolete, basally pulvinate and broadly sulcate above, commonly alate; leaflets 3--7, unequal, often folded, coriaceous, rigid when dry, rather shiny or glossy and bright- or dark-green above, much lighter green beneath, lanceolate or lanceolate-obovate to lanceolate-ovate, all similar to each other in all respects except size, 10--55 cm. long, 5--19 cm. wide, the central one largest, the rest gradually smaller, the lowermost (outermost) smallest, apically abruptly and shortly acuminate or obtuse, sometimes tapering to the acute or even long-acuminate apex, marginally entire or apically more or less lacerate, revolute, basally long-acuminate or cuneate and attenuate into the subalate petiolules, glabrous on both surfaces, sparsely resinous-punctate, purplish when immature, roughish to touch, when dry with the epidermis stomatose-subbullate; secondaries 7--16 (usually 12--16) pairs, they and the midrib prominent beneath, canaliculate above, marginally anastomosing; veinlet reticulation prominulous above, inconspicuous beneath; inflorescence terminal, solitary or paniculate with 3--5 panicles arranged in flabelliorm fashion, 20--100 cm. long, 15--30 cm. wide, erect, sometimes also axillary and subpendulous, reddish-brown or pale purplish-red (especially the floral portions); peduncles dark-purple or in age yellowish-green, tetragonal, compressed, canaliculate, 5--20 cm. long, apically dilated-flattened, glabrous, sparsely lenticellate; incrassate and nutant in fruit; panicles 1--10 cm. long or the central and lower ones to 20 cm. long, opposite, or flabellately branched, the branches 3--5 pairs, the cymes small, solitary or paired, opposite or alternate, trichotomous, 1--many-flowered, 0.7--2.5 cm. long, bracteolate, on stalks 1.5--12 mm. long, glabrous; bracts whitish or pale-greenish to purple, subsessile, lanceolate or ovate, 3--10 mm. long, 3--7 mm. wide, apically abruptly acute, basally attenuate and subventricose alate, subglabrous on both surfaces or sublepidote above, resinous-punctate; bractlets in the cymes small, sessile, oblong or lanceolate, 2--5 mm. long, 0.5--1 mm. wide, purple, apically acuminate, glabrous or lepidote; flowers numerous, small, shortly pedicellate or sessile, crowded at the ends of the panicle-branches, odorous, subtended by 1 or 2 purple, lanceolate, glabrous, deciduous prophylla 0.5--1 mm. long; pedicels absent or to

3 mm. long; calyx campanulate, 1.5--3.5 mm. long, 2--2.5 mm. wide, externally purple or rose-color and sparsely fulvous-pubescent or subglabrescent, internally glabrous, resinous-punctate, the rim 5- (rarely 4-) dentate, subbilabiate, the upper lip 3- (rarely 2-0 lobed, the lower lip with 2 larger lobes, the teeth apically acute and 0.7--1.5 mm. long; corolla mostly violet or pale blue-violet to almost white, caducous, the throat brown-striate, the tube subcapuliform-tubular, 5--8 mm. long, 2.5--4 mm. wide, 2--3 times as long as the calyx, externally the lower third glabrous, the upper 2/3 pubescent, internally glabrous below the stamen insertion, sparsely long-villous above that point, resinous-punctate throughout; corolla-limb subbilabiate, the upper lip 2-lobed with ovate or broadly oblong apically acuminate lobes, the lower lip 3-lobed, whose lateral lobes are ovate-oblong, similar to the upper ones but wider, 2.5--4 mm. long, 1.5--3 mm. wide, whitish, reflexes, sparsely pubescent on both surfaces, the middle lobe much larger, broadly oblong, 3--6 mm. long, 2--5 mm. wide, apically obtuse or rounded, blue and usually darker than the upper lip, with a yellow or yellowish base, densely puberulent on both surfaces, resinous-punctate; stamens 4, didynamous, the filaments white or pale-violet, subulate-filiform, the lower 2/3 to 3/4 sparsely long-villous with whitish hairs, glabrous above, inserted above the middle of the corolla-tube, incurved, 4--7 mm. long and somewhat exserted; anthers dark-violet or dark-purple, soon blackening, opaque, glabrous, dorsifixed above the middle, the thecae elliptic, slightly divergent, 0.7--1.2 mm. long, eglandular; pollen white; style filiform, terete, 8--10 mm. long, slightly exserted, glabrous, subincurved; stigma shortly bifid, the branches divergent; ovary sessile, depressed-globose, apically villous, the remainder glabrous, resinous-punctate, bilocular, the locules 2-ovulate, often imperfectly 2-locellate; ovules pendant from above the middle or near the apex; fruiting-calyx greatly spreading hypocrotiferiform, 3--5 cm. long, 3--4.5 cm. wide, yellowish-green when young, later brownish, marginally sinuate-undulate and recurved; fruit large, green or greenish-yellow, dry, indehiscent, 5--10 mm. in diameter, the exocarp woody, by abortion 1-seeded, ovoid-conic or ovate-oblong, costate-sulcate; seeds apically attached, pendant, ovoid or globose, white, exalbuminous, 1.5--2.5 cm. in diameter, the testa membranous, whitish or cream-color, the embryo straight, the cotyledons very thick, ovoid-orbicular, apically irregularly and very shortly emarginate, externally reticulate-rimose, the plumule inconspicuous, the radicle short, scarcely prominent.

Recent collectors have found this plant growing in freshwater swamps, forests and secondary forests, swamp forests, on brown soil, in "primary forests near rivers", and in "rocky places in jungles near waterfalls", at sealevel to 500 m. altitude, in anthesis from December to October, and in fruit in February, April, May, August, and December. It appears to be native from the Philippine Islands and Malay Peninsula to Borneo, Banka, and Sumatra. It occurs in cultivation in Java.

The corollas are said to have been "white" on *Taha 269*,

"white with a pale-blue spot" on Achmad 1013, "white and bluish-gray" on Wenzel 3163, "pale-blue" on Achmad 1545 and Elmer 7096, "pinkish-blue" on Soepadmo 43, "blue" on Elmer 21698, H.B.1070, and Ridley S.F.13439, "blue-purple" on Yates 2553, "pale-blue with a brown spot" on Achmad 1702, "violet" on Haniff 14339, "purplish" on Talip SAN.52935, "purple" on Dorst T.I.P.728, and "chocolate" on Zain SAN.62891.

The species is based on *Teijsmann* s.n. from Palembang on Danku Lematang, Sumatra, deposited in the Buitenzorg herbarium. *Vitex peralata* is based on Wray 2029, 2254, & 2305 from Perak and King's collector 2064, 6187, 6874, & 8299 from Larut. *Vitex philippinensis* is based on Herb. Philip. Forest Serv. 387 from Zambouanga province, Mindanao, Philippine Islands. *Vitex koordersii* is based on Buurman van Vreeden 158 [Koorders 10832 β] and Koorders 10483 from Sumatra and Jaheri s.n. from Borneo, but Kostermans has designated the former as the type and the latter as a "syn-type". Fedde & Schuster (1932) cite *Koorders 10483 β* as the type.

There is a *Bianchi* s.n. collection from Java [cultivated] in the Show Collection at Buitenzorg. King's collector 5249 exhibits especially narrow leaflets and is said to be taken from "a very rare tree".

Kostermans, in a letter to me dated September 10, 1951, says that "*T. pteropodum* is sometimes very common and grows in[to] a tree of 20 m. height with narrow high buttresses (up to 4 m high), which merge gradually in[to] the bole. The bark of this species is yellowish. The notes that I copied from a label contending that the wood contains an itching substance [and causes skin eruptions] is false. The truth is, that the ash of the burnt wood, when blown about, is very itching. It is called miang and not "ma-ing". The word miang is commonly used for the hairs on bamboo shoots, which are very itching."

Uphof lists (1968) this species as from "W. Malayan Arch., Indonesia" and reports that "From the seeds with coconut oil a salve is made by the natives, used for haemorrhoids". Heyne (1927) says that in Java the fruits are medicinal, used internally and externally for intestinal ailments. Burkill (1966) reports that the wood is used to make rafters and as fuel. He says that the plant occurs "almost throughout Malaysia; in the Peninsula it occurs in Larut and in the south." Greshoff (1900) says that "the tree is feared in Sumatra because of the acidity of its juice" and that it is not used there for domestic or commercial purposes.

Kostermans (1951) notes that "Dissection of the living fruit revealed that they are built along the same principle as those of *T. bogoriense* Koord. The jelly-like clear substance which fills the central part of the cotyledons in early stages, disappears later than in *T. bogoriense*. In the latter it has disappeared in a fruit of 4 cm long, in *T. pteropodum* it was found to be still present in a fruit of 5 cm. length. The fruit is deeply furrowed outside. The flowers are pale blue-violet, almost white, the lower lip, however, being darker with yellow base inside. The anthers are dark-violet."

Vernacular names reported for *T. pteropodum* are "bloeboek loepa", "buli-cahoy", "djandjoeng boekil", "djandjung bukit", "ingkuh-ingkuh", "kaju gedang", "lapak gari", "medang poedi", "medang poodi", "pinang gah", "pokok agak paya", "punggang", "pungung", "rarak gunung", "sepoegang", "sepoendang", "sepugang", "sepundang", "sepungang", "sepunggang", "sipanoeh", "sipanooh", "sipanuh-alafai", "sipanuh-pajo", "tanggungan", "tikiko", "tjempana", "tjẽmpana", "tjempana pajo", and "tjempang".

It should be noted here again that the Miquel (1860) reference in the bibliography of this species (above) is often miscited as "1862", the Gamble (1908) reference is often cited as "1909", and the Merrill (1929) reference as "1928".

Lam (1919) cites *H. Bogor. 1070* & *Teijsmann s.n.* from Sumatra and *Cuming 1698* from the Philippine Islands. Bakhuisen van den Brink (1921) cites *Beccari 429* from Borneo, *Teijsmann s.n.* from Banka, *Koorders 10481* & *10483* and *Teijsmann 3680* from Sumatra, and *Elmer 9096* and *Fenix 1326* from the Philippines. He comments that the trunk is "15--35 c.M. alta", but this surely is a typographic or stenographic error for "M."

Merrill (1923) cites *Ahern 386*, *Cuming 1689*, *Elmer 7096*, *Fajatin s.n.* [Herb. Philip. Forest Bur. 22932], *McGregor s.n.* [Herb. Philip. Bur. Sci. 18525], *Merrill 1326*, *Ramos s.n.* [Herb. Philip. Bur. Sci. 17449 & 24490], and *Wenzel 1410* from Biliran, Leyte, Mindanao, and Samar, Philippine Islands.

Fedde & Schuster (1932) cite *Teijsmann 36804* and *Koorders 10481* & *10483* from Sumatra, *Teijsmann s.n.* from Banka, *Beccari 429* from Borneo, and *Elmer 7096* and *Fenix 1326* from the Philippines.

Kostermans (1951) cites the following collections: MALAYA: Johore: *Corner S.F.24980*, *32771*, *s.n.*; *Ridley S.F.13493*. Kedah: *Henderson S.F.35439*. Pahang: *Evans S.F.13173*. Penang: *Ridley 2580*. Singapore: *Ridley 6752a*. Trengganu: *Corner s.n.*. Locality not designated: *Cantley's collector 2092*. MALAYAN ISLANDS: Damar: *Max 6752*. PHILIPPINE ISLANDS: Leyte: *Elmer 7096*. Mindanao: *Fenix B.S.1326*, *Ramos & Conocar B.S.83466*, *Wenzel 3163*. GREATER SUNDA ISLANDS: Kalimantan: *Endert 3333*, *4717*; *Beccari 429*, *Jaheri s.n.* Sabah: *Carr S.F.24256*; *Elmer 21698*. Simular: *Achmad 1013*, *1074*, *1545*, *1702*. Sumatra: *Buurman van Vreede s.n.*, *Buwalda 648* [BB.30056], *deHaan 881* [BB.29567], *Dorst T.I.P.728*, *Endert E.828*, *Koorders 1048*, *10483*, *Teijsmann H.B.3680*, *Thabranie 74* [BB.12809], *Van der Zwaan T.3.P.825*, *Yates 2553*. CULTIVATED: Java: *Herb. Hort. Bot. Bogor. XI.K.9*. Altschul (1973) cites *Sulit 2636*.

The *Patrick NT.702* [SAN.39454], distributed as *T. pteropodum*, actually is *T. bogoriense* Koord., while *Lasan SAN.65646* and *Sam SAN.61572* and *T. bogoriense* var. *pentaphyllum* Mold. and *Meijer SAN.47231* is *T. glabrum* Merr.

Citations: PHILIPPINE ISLANDS: Leyte: *Elmer 7096* (Bz--73238, Bz--73239, N); *Wenzel 1410* (N), *1656* (N). Mindanao: *Fenix 1326* (Bz--73237, N); *Ramos & Conocar s.n.* [Herb. Philip. Bur. Sci. 83466] (Ba, Ba, Bz--73235); *Wenzel 3163* (Au, Au, Bz--73236, Ca--316652, Mu, N). Samar: *M. Ramos s.n.* [Herb. Philip. Bur. Sci.

17449] (W--901340), s.n. [Herb. Philip. Bur. Sci.]4490] (W--1239427). Island undetermined: *Cuming* 1698 [Herb. Reichenb. f. 71216 & 71218] (V, V, V). MALAYSIA: Johore: *Corner* 32771 (Bz--73287). Kedah: *M. R. Henderson* 35439 (Bz--73288). Perak: *Haniff* 14339 (Ca--243372); *King's collector* 5249 (Ca--529751). GREATER SUNDA ISLANDS: Kalimantan: *Beccari* 429 (Bz--73212, Mu, S, V); *Endert* 3333 (Bz--72634), 4717 (Bz--72757); *Jaheri* s.n. [Borneo] (Bz--73213, Bz--73214, N--photo, Z--photo); *Tromsson* 961 [BB. 18939] (Bz--73218). Sabah: *Elmer* 21698 (Bi, Bz--73215, Ca--312136, Du--175336, Mi, Mu, N, Qu); *Kinted SAN.19080* (Z); *Taha* 269 [D. D. Wood 2578] (Ca--320387); *Talip SAN.52935* (Z); *Zain SAN.62891* [BK. 939] (Z). Simalur: *Achmad* 1013 (Bz--73285, Bz--73286), 1074 (Bz--73283, Bz--73284, N--photo, Ut--60203, Z--photo), 1545 (Bz--73281, Bz--73282), 1702 (Bz--73278, Bz--73279, Bz--73280). Sumatra: *Boschproefstation T.728* (Bz--25703, Bz--25704, N); *Buurman van Vreeden* 158 [Koorders 10832] (Bz--73241, Bz--73242); *DeHaan* 881 (Bz--73248, Bz--73249); *Endert E.828* (Bz--73250, Bz--73251, N, Ut--63697); *H. B. 1070* (Ut--11509, Ut--11510); *Koorders* 10481 (Bz--25664, Bz--73243, Bz--73244), 10483 (Bz--73240); *Soepadmo* 43 (N, S); *Teijsmann* 3680 *H.B.* (Bz--73248, Bz--73249); *Thabranie* 47 [BB.12809] (Bz--73274, Bz--73275, Bz--73276, Bz--73277); *Van der Zwaan T.3.P.825* [Boschproefst. T.825] (Bz--25643), s.n. [93. P.825] (Bz--73246, Bz--73247), s.n. [221.T.I.P.728] (Bz--73245); *Yates* 2553 (Bz--73273, Ca--318357, Mi, N). LESSER SUNDA ISLANDS: Banka: *Teijsmann* s.n. (Bz--25705). CULTIVATED: Java: *Bianchi* s.n. (Bz); *Herb. Ames* s.n. (Oa); *Herb. Hort. Bogor. XI.K.9* (Bz--26573, Bz--26574, Bz--26575, Bz--26579, Bz--26598, Bz--73289, Bz--73290, Bz--73291, Bz--73292, N, N, Ng--16865, Ng). MOUNTED ILLUSTRATIONS: *H. N. Moldenke* color slides 421 (Z).

Two apparently juvenile forms of this species have been described and these are discussed herein following:

TEIJSMANNIODENDRON PTEROPODUM f. juv. *AURICULATUM* (Kosterm.) Mold., stat. nov.

Synonymy: *Teijsmanniodendron auriculatum* Bakh. ex Kosterm., *Reinwardtia* 1: 94, in syn. 1951. *Teijsmanniodendron pteropodum* var. *auriculatum* Kosterm., *Reinwardtia* 1: 94. 1951. *Teijsmanniodendron pteropodum* var. *auriculata* Bakh. ex R sum  354, in syn. 1959. *Teijsmanniodendron auriculatum* Bakh. ex Mold., R sum  354, in syn. 1959.

Bibliography: Kosterm., *Reinwardtia* 1: 75, 79, 94, & 106. 1951; Mold., R sum  354. 1959; Mold., *Fifth Summ.* 2: 640 & 641. 1971; Mold., *Phytologia* 46: 466. 1980.

This is a juvenile form of the species with the base of the petiole-wings distinctly auriculate. It was thought by Bakhuizen van den Brink to represent a distinct species and later by Kostermans as a variety, but Kostermans in a letter to me dated September 10, 1951, says "The variety *auriculatum* should be deleted. In young trees the wings along [the] petiole are very conspicuous, but the older the tree, the less the wings are visible. In full grown trees there is no trace of wing present, but I found the normal, winged leaves on coppice shoots of such trees." It appears,

then, that this form is similar to the juvenile forms seen in *Vitex altissima* f. juv. *alata* (Willd.) Mold. and *V. peduncularis* f. juv. *roxburghiana* (C. B. Clarke) Mold. It seems probable that *Vitex philippinensis* Merr. may also represent this form since Merrill (1903) describes its petioles as "broadly winged, the foliate wings broadly ovate, cordate at the broadly rounded base and also at the apex, the entire breadth 13 cm.", but he also describes its flowering panicles, apparently taken from the same type tree.

In his 1951 work Kostermans noted that "In Herbarium Bogoriense there are some specimens from Borneo bearing the manuscript name *Teijsmanniodendron auriculatum* Bakh. The leaves of these specimens, which are all sterile, differ from *T. pteropodum* in the small wings (auricles) at the base of the petioles.....In the specimen *bb.14752* these auricles are even absent. In other respects the leaves are not different from those of *T. pteropodum*. As in the latter species the dimensions of the wings of the petiole vary considerably (in the specimen *Corner S.F.32771*, the wing reaches only half way [up] the petiole and in the specimen mentioned below, traces of the remainder of the wings are sometimes found as small ridges along the petiole, or as narrow winglets near the tip of the petiole."

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Abdulhamid 47* [BB.12563] (Bz--73223--type, Bz--73224--isotype, N--photo of type, Z--photo of type), *115* [BB.14752] (Bz--73219, Bz--73220, Bz--73221, Bz--73222); *Van der Zwaan 810* [BB.18550] (Bz--73217), *954* [BB.18932] (Bz--73216), *961* [BB.18939] (Bz). Sabah: *SAN.54522* (Z). Sumatra: *Buwalda 648* [BB.30056] (Bz--73252). LOCALITY OF COLLECTION UNDETERMINED: *Herb. Acad. Rheno-Trai. s.n.* (Ut--44161).

TEIJSMANNIODENDRON PTEROPODUM f. juv. *CRISTATUM* Mold., *Phytologia* 44: 473. 1979.

Bibliography: Mold., *Phytologia* 44: 473 (1979) and 46: 466. 1980.

This curious juvenile form differs in having the wings on its petioles very much and quite uniformly enlarged in the form of a crest, the crest extending from the apex to the base on each side and about 5 cm. wide at the midpoint, making the total width of the petiole at this central point about 10 cm..

The form is based on *G. Mikil SAN.37769* from along the side of a stream 9n primary forest on a steep valley side at Sg. Sosopodon, Penampang district, Sabah, at about 800 feet altitude, collected on December 16, 1963, and deposited in my personal herbarium.

Collectors describe this plant as a tree, 30--45 feet tall, with a crown of "5 m. 40 cm.", a clear bole ro 20 feet high, a trunk 2 feet 7 inches in girth, the bark dark-gray or "gray-brown-dippled", smooth or scaly, the inner bark yellow-orange or ochre, turning pale-yellow or brown, 2 cm. thick, the outer bark slash thin, green, the inner yellowish, the outer wood yellowish, the sapwood pale-yellow or yellow-orange, the cambium "cork-green" [=dark-green?], the flowers "palish", and the fruit greenish-

yellow. They have encountered it at altitudes of 200--800 feet, in anthesis in December and in fruit in August, growing at forest margins, on hillsides, and along streams in primary forest in blackish sandstone areas on steep valley sides. The fact that collectors speak of the flowers and fruit and give such large dimensions for the tree and its trunk casts some doubt on whether this is really only a juvenile form of *T. pteropodum*.

Citations: GREATER SUNDA ISLANDS: Sabah: Abas SAN.85958 (Z); Chai SAN.26042 (Sn); Mikil SAN.37769 (Z--type).

TEIJSMANNIODENDRON SARAWAKANUM (H. H. W. Pearson) Kosterm.,
Reinwardtia 1: 100--102, fig. 5. 1951.

Synonymy: *Vitex sarawakana* H. H. W. Pearson, Kew Bull. Misc. Inf. 1907: 60. 1907. *Vitex tetragona* Hall. f., Meded. Rijks Herb. Leid. 37: 53. 1918.

Bibliography: H. H. W. Pearson, Kew Bull. Misc. Inf. 1907: 60. 1907; Prain, Ind. Kew. Suppl. 4, imp. 1, 248. 1913; H. Hallier, Meded. Rijks Herb. Leid. 37: 53. 1918; H. J. Lam, Verbenac. Malay. Arch. 175--176, 202, & 370. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 48, 52--54, & 59. 1921; E. D. Merr., Enum. Born. Pl. 514 & 515. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 219. 1926; Ridl., Kew. Bull. Misc. Inf. 1929: 262. 1929; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 65 & 104 (1942) and ed. 2, 146 & 202. 1949; Kosterm., Reinwardtia 1: 75, 80, 99--102, & 106, fig. 5. 1951; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Mold., Résumé 188, 193, 194, 388, 389, & 470. 1959; G. Taylor, Ind. Kew. Suppl. 12: 141. 1959; Mold., Fifth Summ. 1: 328 (1971) and 2: 727, 728, & 911. 1971; Mold., Phytologia 44: 223 (1979), 45: 490 (1980), and 46: 467, 491, & 493. 1980.

Illustrations: Kosterm., Reinwardtia 1: 101, fig. 5. 1951.

A tall shrub or more usually a small tree, to 70 feet tall; clear bole to 45 feet high, to 20 cm. in diameter at breast height, to 32 inches in girth, glabrous (except for the inflorescence), with buttresses to 1 1/2 feet high and 1 foot wide; outer bark smooth to scaly or flaky, corky, white or whitish to gray or yellowish-white, sometimes brown- and white-mottled, often covered with lichens; inner bark light-gray or greenish to pinkish, yellow, ochre, or pale-orange; cambium white; sapwood hard or very hard, white or yellowish to yellow, ochre, or pale-orange; branches tetragonal, glabrous; branchlets acutely tetragonal, gray, 2--2.5 mm. thick; nodes enlarged, often rather plainly annulate; leaves decussate-opposite, 1-foliolate, glabrous; petioles subterete, 1--2 cm. long, deeply but narrowly sulcate above with subulate margins, basally somewhat and apically greatly swollen; leaflet-blades rigid-chartaceous or thin-coriaceous, oblong or oblong-lanceolate to lanceolate, 10--42 cm. long, 2--6 cm. wide, apically subacutely acuminate or caudate-acuminate (the acumen itself to 3 cm. long), marginally entire and subrevolute or revolute, basally acute to subcuneate or rounded, glabrous, subbullate or bullate, olivaceous and rather shiny above, opaque beneath, penninerved; secondaries 6--14 per side, impressed or prominent above, plainly prominent beneath, the upper somewhat cur-

vate-ascending and often connected in loops, the lower more so and submarginally plainly subconfluent; veinlet reticulation slender, subclathrate and loosely reticulate, very distinct beneath, sometimes with a very distinct intramarginal collective vein; inflorescence paniculate; panicles terminal (up to 5) or alternately axillary (one), small and narrow, loose, to 17 cm. long, usually very shortly branched, glabrous or [the pedicels and flowers] minutely puberulous, the nodes distant on the tetragonal rachis, dichasial with 1 cm. internodes which are often conspicuously ampliate and flattened at the ramifications; flowers short-pedicellate, arranged in 3-flowered, opposite, bracteate, and short-stipitate cymules, 7--10 mm. long; pedicels short, about 1 mm. long, densely appressed-puberulent; calyx campanulate or cyathiform, 2--2.5 mm. long, externally minutely appressed-pubescent but less densely so than the pedicels, the rim shortly 5-dentate, the teeth about 0.5 mm. long, apically acute; corolla zygomorphic, often greenish or cream-color, varying to yellowish, bluish, or purple, the tube cylindrical, about 5 mm. long, externally densely appressed- and ochraceous-pubescent above the middle, internally gray-puberulent or villous; corolla-limb zygomorphic, 4- or 5-lobed, the anterior (lower) lobe the largest, flabelliform, 2--3 mm. long, about 2.5 mm. wide, externally pubescent, shortly gray-villous at the base, the lateral and posterior lobes smaller, shortly oblong, apically obtuse, pubescent; stamens inserted below the middle of the corolla-tube, scarcely exerted; filaments white, finely pilose or villous; anthers "4, star-shaped", blackish; style 7--8 mm. long, apically shortly and acutely bilobed; ovary globose, densely and minutely pubescent; fruiting-calyx shallowly cupuliform, 5--8 mm. long, 12 mm. wide, enveloping the lower 2/5 of the fruit, the rim entire or 5-dentate; fruit drupaceous, obconic or obovoid to shortly ellipsoid or subglobose, about 10 mm. long and 18 mm. wide, much exerted from the accrescent fruiting-calyx, minutely pubescent or ochraceous-pulverulent or "partly covered by a dark bluish-green powder", green or greenish (immature?), 1-seeded by abortion.

The corollas are described as having been "pale-yellow" on *Sinanggul SAN.57448*, "purple" on *Clemens & Clemens 21825*, "gray" on *Wing SAN.19022*, "green" on *Daud & Tachum 36052*, "brownish-blue" on *Krispinus SAN.87340*, "blue and yellow" on *Meijer SAN.37924*, "white with pale-mauve markings" on *Anderson 14717*, and "tube creamy, tinged purple, 3 small lobes light-purple, 1 large lobe purple" on *James & al. s.n.* The collection by James and his associates bears a notation to the effect that the corollas are only 4-lobed, "3 lobes small, 1 lobe large".

Collectors have encountered this species in brown, brownish, or red-brown clay or sandy-clay soil, often rocky, along roadsides, among sandstone boulders, in primary forests on ultrabasic rock strata, near rivers, on forested ridges and hilltops, on gentle slopes covered by mixed dipterocarp forests, and in disturbed forests on hillsides, at 35--750 m. altitude, in anthesis in March, April, August, September, November, and December and in fruit in February, March, and July to October. A vernacular name

reported for the tree is "entabuloh".

The species is based on *Beccari* 2280, 2506, and 2851 from Sarawak. *Vitex tetragona* is based on *Amdjah* 955 from Gunung Pembliangan in eastern Borneo, collected in November of 1912 and deposited in the Rijksherbarium at Leiden..

Ridley (1929) compares the species with *Vitex havilandii* Ridl., which, he says, seems to differ only in its smaller leaves, not basally acute nor chartaceous, the calyx being not pubescent, and the corollas much smaller.

Kostermans (1951) cites *Pierre* 37 from Cochinchina, *Baumée* A. 494 from Sumatra, and *Amdjah* 955, *Clemens* 21825 & 21826, and *Bud & Tachun* 36052 & 36068 from Borneo. Of these, however, I regard *Pierre* 37 as *T. pierrei* Mold. and *Clemens* 21826 as *T. unifoliatum* (Merr.) Mold.

Material of *T. sarawakanum* has been misidentified and distributed in some herbaria as *T. hollrungii* (Warb.) Kosterm. On the other hand, the *Sinanggul* SAN.57450, distributed as *T. sarawakanum*, actually is *T. hollrungii* (Warb.) Kosterm., while *Ambullah* SAN.31476, *Sadau* SAN.43460 [Herb. Forest Dept. 40815] and *Talip & Sabirin* SAN.48750 [NT.738] are *T. subspicatum* (H. Hallier) Kosterm.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Amdjah* 955 [1224] (Bz--73121, N--photo, Z--photo). Sabah: *Ahmad & Sabirin* SAN.48731 [NT.509] (Ld), SAN.48947 [NT.495] (Ld); *Krispinus* SAN.87340 (Sn--55131); *Lajangah* SAN.32184 (Ld); *Meijer* SAN.37924 (Z), SAN.44090 [NT.142; Herb. Forest Dept. 40810] (Ld), SAN.51242 [NT.2; Herb. Forest Dept. 40816] (Ld); *Nordin & Ali* SAN.54430 (Ld); *Sinanggul* SAN.57448 (Z); *Talip* SAN.52795 (N); *Wing* SAN.19022 (Z). Sarawak: *J. A. R. Anderson* 14717 (A); *Chai & al.* s.n. [Herb. Sarawak Forest Dept. S.33142] (Ld, Z); *Clemens & Clemens* 21825 (Bz--73094, Bz--73095, E--986291); *Ilias & Azahari* s.n. [Herb. Sarawak Forest Dept. S.35648] (Ld); *James & al.* s.n. [Herb. Sarawak Forest Dept. S.35078] (Ld). Sumatra: *Beumée* A.494 (Bz--73092, Bz--73093); *H. O. Forbes* 3204 (W--2185256).

TEIJSMANNIODENDRON SCABERRIMUM Kosterm. ex Mold., Fifth Summ. 2: 911 & 969, nom. nud. 1971.

Bibliography: Mold., Fifth Summ. 2: 911 & 969. 1971.

A tree, about 13 m. tall; trunk diameter about 15 cm. at breast height; bark green, smooth, the living bark light-brown, about 5 mm. thick; wood yellowish to pale-brown; fruit (immature?) green.

This species is apparently based on *Kostermans* 13644 from on sandstone, at 100 m. altitude, Sangkulirang district, on the Karangan River near Baru Pondong, Kalimantan, Borneo, collected on September 1, 1957. As of September 4, 1980, the editors of the "Index Kewensis" supplement had not located a formal description of this taxon, nor have I been able to find one. The species is known to me only from the original collection cited below.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Kostermans* 13644 (N--isotype).

TEIJSMANNIODENDRON SIMPLICIFOLIUM Merr., Univ. Calif. Publ. Bot. 15: 263--264. 1929.

Synonymy: *Teysmanniodendron simplicifolium* Merr. ex Mold., Alph. List Inv. Names Suppl. 1: 21, in syn. 1947. *Teijsmanniodendron simplicioides* Kosterm. ex Mold., Résumé Suppl. 7: 8, in syn. 1963. *Teysmanniodendron simplicoides* Meijer, Bot. Bull. Herb. Forest Dept. Sandakan 10: 22. 1968. *Teijsmanniodendron simplicifolia* Merr., in herb.

Bibliography: E. D. Merr., Univ. Calif. Publ. Bot. 15: 263--264. 1929; A. W. Hill, Ind. Kew. Suppl. 8: 234. 1933; Fedde & Schust., Justs Bot. Jahresber. 59 (2): 417. 1939; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 65 & 100 (1942) and ed. 2, 145, 146, & 197. 1949; Kosterm., Reinwardtia 1: 75, 79, 95, 96, & 106. 1951; Mold., Résumé 188, 192--194, 354, & 470. 1959; Meijer, Bot. Bull. Herb. Forest Dept. Sandakan 10: 22. 1968; Mold., Fifth Summ. 1: 328 (1971) and 2: 641 & 911. 1971; Mold., Phytologia 43: 252 (1979) and 46: 467 & 493. 1980.

A glabrous or subglabrous tree, to 32 m. tall, with a clear bole often to 14 m. high, to 2 m. in girth and 60 cm. in diameter at breast height, with small to large, often short buttresses to 2 m. high, parallel to the deeply furrowed or fluted trunk, about 2.5 cm. thick, extending outwards to about 50 cm. from the "wadded" base; outer bark thin, 1--5 mm. thick, rather smooth and scaly or rough, fissured, papery, brittle, average in texture, white or whitish to grayish, grayish-green, greenish, or green, varying to yellowish, yellow-brown, brown, or reddish, hard or soft; inner bark fibrous, 2.5--7.5 mm. thick, soft, whitish, yellowish, or yellow to yellow-green or golden, changing to chocolate-brown after 5 minutes exposure; cambium yellow, yellowish, or yellowish-green to golden; exudate watery, slow to appear; sapwood hard or very hard, about 2 cm. thick, heavy, yellow or yellowish to ochre or honey-color or even "whitish changing to blackish", usually almost the same color as the heartwood; heartwood yellowish-brown or brown; branches and branchlets terete, pale, smooth and glabrous, the main branches ascending or spreading, ultimately much rebranched, the branchlets about 1.5 mm. in diameter, crookedly rebranched and spreading; twigs crooked, ascending, rigid; leaves decussate-opposite, 1-foliolate; petioles 8--12 mm. long; leaflet-blades coriaceous, lanceolate, 7--13 cm. long, 1.7--4.3 cm. wide, often standing at ascending or descending angles, recurved toward the tip, usually folded, without oil-glands or only scarcely glandulose, drying pale, almost uniform in color on both surfaces or paler beneath, more or less shiny above, narrowed to both ends, apically conspicuously acuminate, basally acute to obtuse; secondaries 3 or rarely 4 per side, curvate-ascending, very conspicuous beneath, arcuately anastomosing; veinlet reticulation dense, distinct; inflorescence axillary and terminal, slender, glabrous, solitary or fasciculate, about 15 cm. long, the primary branches few, slender, patulous, about 12 cm. long; flowers small, vertically symmetric, sessile, opposite, solitary or fasciculate, in terminal panicles, very fragrant with a honey-like scent; calyx small, broadly campanulate or cupuliform, about 2 mm. long, yellowish

low or whitish, glabrous, the rim shortly 5-toothed, the teeth erect; corolla pale-yellow or white, about 8 mm. long, the tube about 4 mm. long, with blue-purple longitudinal stripes, externally glabrous, internally villous, the limb 5-lobed, about 5 mm. wide, the 4 smaller lobes ovate to suborbicular, about 2 mm. wide, the lower (larger) lobe broadly ovate, about 3 mm. long, with a dark-yellow spot at the base inside; filaments about 3.5 mm. long, glabrous; anthers dark-purple; ovary granulose-glandulose; infructescence greenish, the peduncles pale-green; fruiting-calyx persistent, broadly infundibular, about 1 cm. wide, the rim irregularly lobed; fruit oval or ovoid to subglobose or obovoid, averaging 1.25 cm. long, about 1.5 cm. in diameter, sometimes in pairs, glabrous, smooth, at first green, later bluish, drying purple-brown, the pericarp thin, fragile; seeds solitary, large, globose, about 1 mm. in diameter

This species is based on *Elmer 21837* from near Tawao, Sabah, originally deposited in the herbarium of the Philippine Bureau of Science, now most probably destroyed. Merrill (1929) describes the species as a tree of humid forests, the corollas "pure white except for a yellow blotch on the lower lip" and cites also *Elmer 12618* from Sabah. Kostermans (1951) asserts that it "is close to *T. smilacifolium* (H. H. W. Pears.) Kosterm. and to *T. holophyllum* (Bak.) Kosterm. From the latter it may be easily distinguished by its few (three, rarely four) pairs of lateral nerves and its slender inflorescences, the tiny, broadly campanulate (not urceolate) calyces with erect teeth. From *T. smilacifolium* it differs in its sessile flowers and more slender inflorescences. In the shape of the calyx it agrees with *T. subspicatum* (Hall. f.) Kosterm., which also has sessile flowers and erect calyx-teeth; the branchlets are also glabrous in the latter species. The shape of the leaf, however, is different, the base in *T. subspicatum* being rounded, not acute, the lateral nerves more numerous. Moreover, the inflorescences are not slender and the flowers slightly larger!"

Collectors have encountered *T. simplicifolium* in primary, very humid forests and rainforests, well-drained forests, and virgin jungles, and on hillsides, hilltops, slopes and ridge-slopes, in black or brown soil, at 33--1200 m. altitudes, in anthesis in February, April, August, and September and in fruit in March, April, and October.

The corollas are described as having been "white" on *Chai SAN. 29799*, "yellow" on *Chai SAN. 29798*, "yellow-white" on *Lajangah SAN. 44587*, "white, yellow spot on lip" on *Richards 2568*, "white, yellow spot at base or larger petal" on *Martyn SAN. 21619*, and "pure-white except for a yellow blotch on lower lip" on *Elmer 21618*.

Vernacular names reported for this species are "anggal", "butun", "kaju gadang", "kemuning", "kemuning", "osan", and "ubah sireh".

Martyn reports that the wood is used by the natives in Sabah for posts and is said to be durable against borers, that "the log dries hard and easily crushes to small pieces when dry", and that the tree is "not plentiful".

Elmer 21618 is marked "n. sp." on its printed labels, but is not

the type collection. The *Vitex simplicifolia* of C. B. Clarke is *Teijsmanniodendron hollrungii* (Warb.) Kosterm., while that of Menninger is *Vitex trifolia* var. *simplicifolia* Cham.

Kostermans (1951) cites *Buwalda* 431 [BB.28654] from Sumatra, *Elmer* 21618 & 21837 from Sabah, *Richards* 2568 from Sarawak, and *Endert* 3287 & 3625, *Frijd* 19 [BB.13564], and *Zwaan* 319 [BB.11674] from Kalimantan. *Endert* 3625, however, I regard as representing *T. simplicifolium* var. *kostermansi* Mold.

Material of *T. simplicifolium* has been misidentified and distributed in some herbaria as *Vitex holophylla* J. G. Baker. On the other hand, the *Nicholson & Sam* SAN.17687 (TN.165), distributed as *T. simplicifolium*, actually is var. *kostermansi* Mold.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Endert* 3287 (Bz--72759); *Frijd* 19 [Boschproefst. BB.13654] (Bz--73262, Bz--73263); *Kostermans* 12732 (N); *Zwaan* 319 [Boschproefst. BB.11674] (Bz--73264, Bz--73265). Sabah: *Ahmad & Sabirin* SAN.48683 [NT.451] (Sn--41661), *SAN.52406* [NT.693] (Sn--41658); *Chai* SAN.21641 (Ld), *SAN.26651* (Ld), *SAN.29346* (Ld), *SAN.29798* (Ac), *SAN.29799* (Z); *Elmer* 21618 (Bi, Bz--73260, Ca--312138, Du--165326, Mi, Mu, N, S, Ut--86492), 21837 (Bi--isotype, Bz--73259--isotype, Ca--312135--isotype, Du--164136--isotype, Mu--isotype, N--isotype, N--photo of isotype, S--isotype, Ut--86222--isotype, Z--isotype, Z--photo of isotype); *Jumatin* SAN.55871 (Sn--41644); *Lapangah* SAN.44587 [Herb. Forest Dept. 40846] (Ld); *Martyn* SAN.21619 [Herb. Forest Dept. 0434/84] (Ld); *Mikil* SAN.28097 (Z); *Villamil* 155 (W--1376817). Sarawak: *Pickles* 3524 (W--2377006), 3564 (W--2377044); *P. W. Richards* 2568 (Bz--73261). Sumatra: *Buwalda* 431 [Boschproefst. BB.28654] (Bz--73258, N).

TEIJSMANNIODENDRON SIMPLICIFOLIUM var. *CORDIFOLIUM* Mold., *Phytologia* 43: 252. 1959.

Bibliography: Mold., *Phytologia* 43: 252 (1979) and 46: 467. 1980.

This variety differs from the typical form of the species in having the base of the leaflet-blades decidedly cordate.

The variety is based on *Gibot* s.n. from along the Simpang trail in the Ranau district of Sabah, collected on September 18, 1967, and the type (holotype) is no. 41663 in the herbarium of the Forest Department at Sandakan, Sabah. The collector notes that the plant is a tree to 50 feet tall, the trunk with a girth of 37 inches at breast height.

Other collectors report the tree as sometimes having a bole 30 feet high and a crown of 20 feet. The corollas are said to have been "reddish" on *Gibot* SAN.61833, and the tree has been found in anthesis in February

Citations: GREATER SUNDA ISLANDS: Sabah: *Gibot* SAN.60725 (Sn--41663--type), *SAN.61833* (Sn--41652).

TEIJSMANNIODENDRON SIMPLICIFOLIUM var. *KOSTERMANSI* Mold., *Phytologia* 4: 57. 1952.

Synonymy: *Teijsmanniodendron simplicoides* Kosterm., *Reinwardtia* 6: 303 & 325, fig. 22. 1962. *Teysmanniodendron simplicifolium*

velottinis Merr., in herb.

Bibliography: Kosterm., *Reinwardtia* 1: 96. 1951; Mold., *Phytologia* 4: 57. 1952; Mold., *Résumé* 194 & 470. 1959; Kosterm., *Reinwardtia* 6: 303 & 325, fig. 22. 1962; Mold., *Résumé Suppl.* 7: 8. 1963; Nicholson, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 86. 1965; Meijer, Bot. Bull. Herb. Forest Dept. Sabah 10: 22. 1968; G. Taylor, Ind. Kew. Suppl. 14: 134. 1970; Mold., *Fifth Summ.* 1: 328 (1971) and 2: 641 & 911. 1971; Mold., *Phytologia* 46: 467 & 493. 1980.

Illustrations: Kosterm., *Reinwardtia* 6: 325, fig. 22. 1962.

This variety differs from the typical form of the species in having its petioles and the tips of the branchlets densely ferruginous-hirsute, the hairs eventually wearing off.

It is based on *C. J. van der Zwaan 1074* from Berouw Betemoean, southeastern Borneo, collected on May 28, 1934, and deposited in the Herbarium Bogoriense at Buitenzorg.

Kostermans (1951) has suggested that this taxon might even represent a new species related to *T. simplicifolium* and in 1962 he published it as *T. simplicoides*. He also feels that the *Endert 3625*, cited below, actually represents typical *T. simplicifolium* Merr. He cites for his new species only *Boschproefst. BB. 11204 & 19034* from Kalimantan and *Meyer SAN.19280* from Sabah, and bases his *T. simplicoides* on *BB.19034* from Betemuaer, at 25 m. altitude, deposited in the Buitenzorg herbarium.

Collectors describe the plant as a tree, to 40 m. tall, with short, steep, rounded buttresses to 2 m. high, 0.7 m. long, and about 7.5 cm. thick; clear bole to 19 m. high, straight, fluted, to 50 cm. in diameter at breast height and 25 cm. in diameter at the first branch; girth to 1.7 m. at breast height; crown to 26 m.; bark smooth or cracked and scaly, whitish or gray to pale "yellowish-brownish", often covered with mosses; outer bark thin, about 5 mm. thick, white or greenish-white to chocolate-brown; inner bark about 1 cm. thick, yellow or yellowish to greenish, grayish-ochre, or red-brown, light-brown near the cambium, discoloring on exposure; cambium yellow; wood hard, yellow, the sapwood hard, yellowish or pinkish to ochre or light reddish-brown; outer slash yellow; middle slash yellow or greenish; inner slash yellowish or gray; branches slender, stiff, gray, smooth, thickened at the nodes, glabrous; branchlets with a rich indument of stiff hairs; leaves decussate-opposite, 1-foliolate; petioles 5--10 mm. long, apically and basally incrassate; leaflet-blades stiffly coriaceous, ovate-lanceolate to elliptic-lanceolate, 6.5--13 cm. long, 2.5--5 cm. wide, apically usually long-acuminate, basally rounded, smooth above; midrib prominulous above, prominent beneath; secondaries about 4 pairs, very slender, often subimpressed above, strongly arcuate and prominent beneath; veinlet reticulation lax and prominulous beneath; corolla white or yellow to purplish or bluish; stamens yellow.

Collectors have encountered this plant in primary forests, on gentle hillslopes and the sides of valleys, in lowland forest on hills and ridges, on sandstone strata and in brownish soil, at 3--450 m. altitude, in anthesis in February, March, May, and October,

and in fruit from March to May. A vernacular name reported is "manoeek".

The corollas are described as having been "light yellowish-purple" on *Leopold & Henry SAN.48580*, and "yellow" on *Lajongah SAN.32196*, while on the label of *Sam SAN.28830* there is the cryptic statement: "flowers white, corolla bluish" and on *Sam SAN.28834* "flowers white, corolla bluish-yellow".

Sheet number 73255 in the Buitenzorg herbarium has the pubescence almost all worn off from the petioles and twig apex, but close examination shows some pubescence still remaining. Kostermans pointed out, in a notation on sheet number 73256 in the same herbarium, that this plant differs from *T. simplicifolium* only in the tomentum of the branchlets and "pedicels" [probably meaning the petioles]. On sheet number 73257 he has noted that "This may represent a new species related to *T. simplicifolium*. It has pubescent petioles." I do not regard the differences as worthy of more than varietal rank.

Sheet number 72758 in the Buitenzorg herbarium exhibits a coating of what appears to be mold on the twigs, petioles, and parts of the leaves, but the pubescence shows through on the petioles.

Material of this taxon has been misidentified and distributed in some herbaria as *T. holophyllum* (J. G. Baker) Kosterm. and as *T. smilacifolium* (H. H. W. Pearson) Kosterm.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Endert 3625* (Bz--72758); *Zwaan 152* [Boschproefst. BB.11204] (Bz--73255, Bz--73256), *1074* [Boschproefst. BB.19034] (Bz--73257--type, N--photo of type, Z--photo of type). Sabah: *Ampon & Leopold SAN.48192* (Z); *Dewol & Karim SAN.78274* (Sn--41552); *Lajongah SAN.32196* (Ld); *Leopold & Hendry SAN.48580* [TN.253] (Ld), *SAN.61081* [NT.121] (Sn--45407); *Meijer SAN.20454* [NT.38; Herb. Forest Dept. 40828] (Ld), *SAN.36695* (Z), *SAN.51194* (Ac); *Mikil SAN.46647* [Herb. Forest Dept. 40847] (Ld), *SAN.46661* [NT.240] (Ld); *Nicholson SAN.28829* (Ld); *Nicholson & Sam SAN.17687* [TN.165] (Ld); *Sam SAN.28830* [NT.228; Herb. Forest Dept. 40835] (Ld), *SAN.28834* [NT.229] (Ld); *J. Singh SAN.34721* [NT.332] (Ld).

TEIJSMANNIODENDRON SINCLAIRII Kosterm., Gard. Bull. Singapore 17: 6--8, fig. 4. 1958.

Synonymy: *Teijsmanniodendron holophyllum* var. *pubescens* Mold., Phytologia 4: 57. 1952.

Bibliography: Kosterm., *Reinwardtia* 1: 97. 1951; Mold., *Phytologia* 4: 57. 1952; Mold., *Résumé* 194 & 470. 1959; Kosterm., *Gard. Bull. Singapore* 17: 6--8, fig. 4. 1958; K. U. Kramer, *Excerpt. Bot. A.5*: 34. 1962; Mold., *Résumé Suppl.* 4: 9. 1962; G. Taylor, *Ind. Kew. Suppl.* 13: 134. 1966; Mold., *Fifth Summ.* 1: 306 & 328 (1971) and 2: 640 & 911. 1971; Mold., *Phytologia* 46: 467, 472, & 493. 1980.

Illustrations: Kosterm., *Gard. Bull. Singapore* 17: 7, fig. 4. 1958.

A tree, to 5 m. tall; branches and branchlets compressed, stout, gray, the latter minutely scabrous; leaves unifoliolate; petioles

stout, 3--4 cm. long, apically with a conspicuous globose swelling beneath; leaflet-blades medium-green with a yellowish tinge and shiny above when fresh, yellowish-green beneath, drying rigidly coriaceous, conspicuously bullate, elliptic, to 25 cm. long and 13 cm. wide, apically acuminate, marginally entire, basally acute, glabrous above, rather densely ferruginous-pubescent and scabrous and less shiny beneath, the pubescence especially on the larger venation; midrib prominent in a groove above, sharply prominent beneath; secondaries 8--10 pairs, impressed above, prominent beneath, arcuate and marginally arcuately anastomosing; tertiaries lax, rather impressed above and prominent beneath; veinlet reticulation obscure; inflorescence axillary, to 30 cm. long, raceme-like, sometimes consisting of a short main rachis and 2 or 3 long branches; peduncles stout, compressed, sparsely scabrous; flowers in groups of 2 or 3 on a very short pedicel; bractlets narrowly ovate or lanceolate, to 8 mm. long, basally narrowed, apically acute, stiff, persistent; calyx campanulate, 3 mm. long, 5-toothed or -lobed, the teeth ovate, 1.5--2 mm. long, apically subacute; corolla dark-violet or purple, with a yellow-brown patch on the lower lip; fruiting-calyx shallowly cupuliform, 5--7 mm. long, 10--12 mm. wide, the margin irregularly incised; fruit subglobose to obovoid-globose, 10--12 mm. long, apically depressed, glabrous, with an apical and often also a lateral median suture, 2-celled, 2-seeded.

The species is based on *Sinclair & Kiah bin Saleh S.F.N.40877* from Sg. Nerus, on the righthand roadbank at the 16th mile on the Kuala Trengganu road, Trengganu, Malaysia, deposited in the Singapore herbarium. The type of *T. holophyllum* var. *pubescens* was collected by C. J. van der Zwaan (no. 609; *Boschproefst. BB. 12144*) at Berouw, Borneo, on October 25, 1927, and is deposited in the Buitenzorg herbarium as sheet number 73227.

Kostermans (1951), whose description of the species is given in somewhat modified form above, asserts that "The material collected by Sinclair and Kiah makes it clear, that the pilose (scabrous) specimens represent a new species, different from *T. holophyllum* not only by its scabrosity but also by the stout inflorescence and larger flowers and fruit. In sterile condition the species is easily recognized by the scabrous (touch) of the leaf surface." He cites only *Sinclair & Kiah S.F.N.40877* from Trengganu and *Boschproefst. BB.12144* from Borneo. He himself encountered the tree as "very common" in periodically inundated habitats, at 100 m. altitude, in flower and fruit in October, and describes the corollas as "dark-violet".

The *Chai S.31713*, distributed as *T. sinclairii*, is actually the type collection of *T. bintulense* Mold.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Kostermans 21545* (E--1830112); *Zwaan 609* [*Boschproefst. BB.12144*] (Bz--73227, Bz--73228, N, N--photo, Z--photo). Sarawak: *Native collector 374* (W--1290523).

Synonymy: *Vitex smilacifolium* H. H. W. Pearson, Kew Bull. Misc. Inf. 1907: 159. 1907.

Bibliography: H. H. W. Pearson, Kew Bull. Misc. Inf. 1907: 159. 1907; Prain, Ind. Kew. Suppl. 4, imp. 1, 248. 1913; H. J. Lam, Verbenac. Malay. Arch. 175. 1919; ; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 48 & 51. 1921; E. D. Merr., Enum. Born. Pl. 514. 1921; Kosterm., Reinwardtia 1: 75, 79, 95--96, & 106. 1951; Prain, Ind. Kew. Suppl. 4, imp. 2, 248. 1958; Mold., Résumé 193, 194, 389, & 470. 1959; G. Taylor, Ind. Kew. Suppl. 12: 141. 1959; Mold., Fifth Summ. 1: 328 (1971) and 2: 728 & 911. 1971; Mold., Phytologia 44: 223 (1979), 45: 490 (1980), and 46: 467 & 493. 1980.

A shrub (?) or tree, sometimes to 30 m. tall, branching, with a clear straight bole to 10 m. high, to 55 cm. in diameter at breast height, and to 1.6 m. in girth, basally buttressed, the buttresses about 52 cm. high, 60 cm. long, and 7.5 cm. thick; crown to 10 m. high; bark about 5 mm. thick, brittle, the outer bark thin, smooth or rough, flaky to peeling, white or whitish to gray, yellow, or greenish, or even fulvous, brownish, or black; inner bark gray- or grayish-brown to pale-brown or even yellow, yellowish near the cambium; cambium yellow or yellowish to white, about 6 mm. thick; sapwood white or pale-yellowish to yellowish or brown, soft to cut; branches subterete, glabrous; branchlets glabrous; nodes ampliate; leaf-scars prominent; leaves decussate-opposite, 1-foliolate; petioles stout, 1--2 cm. long, apically and basally incrassate, flattened above, glabrous; leaflet-blades sessile, elliptic-oblong, 12--20 cm. long, 4--8 cm. wide, coriaceous, apically acute or acuminate to caudate-acuminate, marginally entire and subrevolute, basally rounded, glabrous on both surfaces, shiny above; secondaries 3 or 4 per side, subparallel, ascending from below the middle of the midrib, prominulous above and prominent beneath to the apex; veinlet reticulation rather obscure above; inflorescence terminal, large, stout, paniculate, 25--30 cm. long, 20--23 cm. wide, branched, lax, more or less leafy below, glabrous, the rachis and side branches "dull dark sordidly glaucous"; cymes opposite or alternate, few-flowered, shortly stalked; bracts small or minute; pedicels very short; flower-buds and calyx apically "dull dark sordidly glaucous"; flowers about 6 mm. long; calyx campanulate, 1.5--2 mm. long, about 2 mm. wide, externally rather sparsely and minutely glandulose, internally smooth, the rim shortly 5-toothed, the teeth very small, ciliolate; corolla zygomorphic, pale-purple or blue to white, the lower lip usually darkish-violet near the throat, with a distal pale-yellow spot; corolla-tube cylindrical, 4--6 mm. long, usually purplish-tinged, the upper part marked externally with sessile peltate glands, internally glabrous except for the villous throat, apically ampliate, the lobes minutely glandulose throughout, the anterior (larger) lobe flabelliform or subrotund, 2.5--3 mm. wide, the posterior and lateral lobes smaller; stamens inserted below the middle of the corolla-tube, barely exerted; filaments dark-purplish to faintly violet, basally dilated and villous; anthers dark-purplish or black; style white, 6 mm. long; stigma bifid; ovary globose, densely or minutely glandular-dotted; fruiting-

calyx somewhat accrescent, about 6 mm. wide; fruit drupaceous, obovoid, greenish when immature and about 4 mm. long and 3 mm. wide, black and larger when fully mature, glandulose.

This species is based on *Beccari 1097* and *1137* from Sarawak, Borneo. As *Kostermans (1951)* has pointed out, it is very closely related to *T. simplicifolium* Merr. "from which it differs mainly in its larger leaves, the stout inflorescences, and pedicellate flowers. It is quite possible that that taxon represents only a luxuriously developed specimen of *T. simplicifolium*."

Collectors have found *T. smilacifolium* growing in primary or secondary forests, on hillsides and ridgetops, often along stream-sides, on lowland and on undulating land, in logged-over areas on flatlands, in clayey or black stony soil, at 33--1000 m. altitudes, in anthesis in January and from July to September, in fruit in November. The *Native collector 1830 & 1910* collections are indicated as topotypes by Merrill.

The corollas are said to have been "white" on *Abullah SAN.37158*, "whitish" on *Leopold & Amin SAN.75369* and *Wing SAN.32582*, "yellowish-green" on *Madani SAN.88898*, "pale-purple" on *Clemens & Clemens 21825*, "purplish" on *Talip SAN.54971*, "pale-blue" on *Hallier B.219*, and "upper corolla-lobe faintly blue, lower 3 lobes darkish-violet near the throat, with a distal pale-yellow spot" on *Jacobs 5391*.

Merrill (1921) cites *Beccari 1097 & 1137* and *Native collector 1830 & 1910* from Sarawak and *Hallier 219* from Kalimantan, Borneo.

Material has been misidentified and distributed in some herbaria as *Vitex havilandii* Ridl., *V. holophylla* Baker, and *Lagerstroemia* sp. On the other hand, the *SAN.28830* [NT.228; Herb. Forest Dept. 40835], distributed as *T. smilacifolium*, actually is *T. simplicifolium* var. *kostermansi* Mold.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Hallier 219* (Bz--73270, Bz--73271), *B.219* (Bz--73268, N); *Jacobs 5391* (Ba, W--2377573, W--2377574). Sabah: *Abullah SAN.37158* (Z); *Agama 575* (N--photo, Ph, Z--photo); *Baker SAN.26866* [Herb. Forest Dept. 40859] (Ld); *Butok SAN.45864* (Sn--408820); *Gibot SAN.31276* [Herb. Forest Dept. 40860] (Ld); *Leopold & Amin SAN.75369* (Sn--40886); *Madani SAN.88898* (Z); *Sinanggul SAN.39981* (Z); *Talip SAN.54971* (Ld); *Termiji SAN.72860* (Sn--115913), *SAN.72862* (Sn--40885); *Wing SAN.32582* (Ld). Sarawak: *Beccari 1097* (Mu--1675--cotype, N--cotype, N--tracing, N--photo of cotype, S--cotype, V--cotype, Z--cotype, Z--photo of cotype); *Clemens & Clemens 21825* [field no. 6119] (N, N); *Native collector 1830* (N--photo, Ph, W--1174178, Z--photo), *1910* (N--photo, Ph, Z--photo).

TEIJSMANNIODENDRON SUBSPICATUM (H. Hallier) Kosterm., *Reinwardtia* 1: 99--100. 1951.

Synonymy: *Vitex subspicata* H. Hallier, *Meded. Rijks Herb. Leid.* 37: 52--53. 1918.

Bibliography: H. Hallier, *Meded. Rijks Herb. Leid.* 37: 52--53. 1918; H. J. Lam, *Verbenac. Malay. Arch.* 166 & 177--178. 1919; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitens.*, ser. 3, 3: 52. 1921; E. D. Merr., *Enum. Born. Pl.* 514. 1921; A. W. Hill, *Ind. Kew. Suppl.* 6: 219. 1926; Mold., *Known Geogr. Distrib. Verbenac.*,

ed. 1, 64, 65, & 104 (1942) and ed. 2, 143, 146, & 203. 1949; Kosterm., Reinwardtia 1: 75, 79, 96, 99--100, 103, 104, & 106. 1951; Mold., Résumé 188, 193, 194, 389, & 470. 1959; G. Taylor, Ind. Kew. Suppl. 12: 141. 1959; Mold., Fifth Summ. 1: 328 (1971) and 2: 728 & 911. 1971; Mold., Phytologia 43: 252 (1979), 44: 223 (1979), and 46: 467, 489, 491, & 493. 1980.

A small tree, to 16 m. tall, glabrous throughout except for the inflorescence; clear bole to 3 m. high, 90 cm. in girth, 20 cm. in diameter at breast height; crown to 5 m. high; buttresses to 1 m. high, parallel to the trunk, and 30 cm. long, or absent; outer bark white or whitish to gray or yellowish, papery to flaky or scaly, about 5 mm. thick; inner bark white or light-greenish to yellowish, yellow, or orange, granular, soft; living bark brown, about 5 mm. thick; cambium yellowish; wood pale-brown or honey-color; sapwood yellowish; branchlets white or pale-ochraceous, stout, terete or obscurely tetragonal, 3--5 mm. thick; leaves rather large, 1-foliolate; petioles short, stout, subterete or semi-terete, 1--3 cm. long; leaflets sessile on a basal conspicuously swollen articulation, to 13 mm. long and 7 mm. in diameter; leaflet-blades rigidly chartaceous, dark-green, ovate-lanceolate, 8--39.5 cm. long and 3--16 cm. wide, often falcate-recurved, apically gradually long-acuminate, marginally entire and revolute, basally acute or rounded, shiny, glabrous on both surfaces, bullate above, subbullate and paler beneath; venation much arcuate-ascending, marginally arcuately joined, impressed above, very prominent beneath, even the veinlet reticulation prominent beneath; inflorescence terminal, paniculate, rarely also axillary in the upper leaf-axils, pedunculate, decussately branched, to 25 cm. long and (including the branches) 10 cm. wide, dark-purple or fuscous, very minutely puberulent, the branches spicate or subspicate; cymules opposite, at the nodes of the rachis, few-flowered, small, sessile; bracts and bractlets minute, linear; flowers small, short-pedicellate; calyx cyathiform, dark red-purple, scarcely 1.5 mm. long, the rim 5-dentate, the teeth deltoid; corolla about 6 mm. long, externally ochraceous-pubescent, white or pink to purple, or even pale-yellow or brownish, the tube dark red-purple, the limb zygomorphic, blue or pale bluish-purple, darker within, the anterior lobe much larger than the others, the lower lip with a yellow band and white hairs or internally basally rufescent-villose; stamens shortly exerted; filaments white, basally pale-blue; anthers almost black, the thecae divaricate; style white, basally pale-blue, long-exserted; fruiting-calyx much accrescent and enlarged, to 7 mm. long and 17 mm. wide, "dirty-brownish-yellow", the rim obsoletely and irregularly dentate, the teeth apically obtuse; fruit at first green, finally black, drupaceous, globose, to 17 mm. long and 11 mm. in diameter, the lower 2/3 enclosed by the fruiting-calyx.

This species is based on *Hallier B.1064* & *1122* from along the larger Sambas River and from between it and the smaller Sambas in Kalimantan, Borneo, and *Forbes 3204* from Sumatra, but Kostermans (1951) has designated *Hallier B.1064* as lectotype. He cites in addition *Endert 2529*, *2819*, & *4746*. Hallier says that of his *B.*

1064: "In meinem Reiseaufzeichnungen als Liane bezeichnet, war aber vielleicht auf Überkleidung des Baumes mit einer Liane und unrichtiger Beobachtung vom Boote aus beruht". He cites also *Koorders s.n.* from Mount Pamaltopas as probably a montane form of the species. He points out its clear relationship with *T. hollrungii* from which he says it differs in the "foliorum articulatione valde tumida, nervis subtus valde prominentibus intermediiisque subbullatis, paniculae ramis subspicatis". Kostermans (1951) maintains that these characters are not sufficient to distinguish the two species. Lam (1919) separated *T. subspicatum* from *T. hollrungii* by the size of the fruit -- 2--2.2 cm. in diameter in *T. holophyllum* and only 1.1 cm. in diameter in *T. subspicatum*. In his 1921 work he included *T. subspicatum* somewhat doubtfully in *T. hollrungii*, but specifically calling attention to the gradually acuminate leaflet-apex in *T. subspicatum*. Kostermans (1951) asserts that *T. subspicatum* differs from *T. hollrungii* "in the glabrous, or almost glabrous, inflorescences, and in the presence [sic! = absence] of the numerous tiny holes (glands) on the lower leaf-surface. I consider the latter character, which characterizes *T. hollrungii*, of sufficient importance to keep *T. subspicatum* as a distinct species.....very close to *T. sarawakanum*."

Collectors have encountered *T. subspicatum* in evergreen tropical forests, on riverbanks in primary forests, in virgin jungles and mixed dipterocarp forests, in open places along roadsides, and in logged-over areas of flatland, at altitudes of 100--830 m., in anthesis in May, June, August, and November, and in fruit in March, May, August, September, and November. Kostermans refers to it as "very common on acid soil" and "rare in dry loamy soil with lime" in Kalimantan, Borneo.

A pencil rubbing of a leaf of *Haviland 3550/796* in the Kew herbarium was made by Merrill at Kew and is deposited in the Britton Herbarium at the New York Botanical Garden.

The corollas are said to have been "white" on *Native collector 5222*, "pale-yellow" on *Native collector 5105*, "pink" on *Hallier 1064* and *Native collector 5076*, "purple" on *Cockborn SAN.64971*, "dark-purple, velvety" on *Kostermans 5151*, and "brownish" on *Krispinus SAN.87314*.

Vernacular names reported for the species are "entabuloh", "medang sisit", and "ubah putih".

Material has been misidentified and distributed in some herbaria as *T. hollrungii* (Warb.) Kosterm., *T. sarawakanum* (H. H. W. Pearson) Kosterm., *Vitex* sp., and *Lagerstroemia* sp.

Citations: GREATER SUNDA ISLANDS: Kalimantan: *Endert 2529* (Bz--72756), *2819* (Bz--72760, Bz--72761, N), *4746* (Bz--72754, Bz--72755); *H. Hallier B.1064* (Bz--73266--lectotype, N--photo of lectotype, Z--photo of lectotype), *B.1122* (Bz--73267); *Kostermans 5151* (Ng--16904), *12755* (N). Sabah: *Ambullah SAN.31476* (Ld); *Cockborn SAN.64971* (Sn--64971); *Krispinus SAN.87314* (Sn--55107); *Sadaw SAN.49460* [Herb. Forest Dept. 40815] (Z); *Talip & Sabirin SAN.48750* [NT.738] (Ld). Sarawak: *Chai S.34719* [F.98] (Z); *Native collector 5076* (Ca--357238, N), *5105* (Ca--357545, N), *5222* (Ca--357566, N).

Sumatra: *Iwatsuki, Murata, Dransfield, & Saerudin S.365 (Ac).*

TEIJSMANNIODENDRON SUBSPICATUM var. *PARVIFOLIUM* Mold., *Phytologia* 43: 252. 1979.

Bibliography: Mold., *Phytologia* 43: 252 (1979) and 46: 467 & 493. 1980.

This variety differs from the typical form of the species in its smaller leaflets, the blades of which when mature are only 5--9 cm. long and 2.3--4.5 cm. wide.

The variety is based on *Meijer SAN.39328* from ultrabasic soil at Ulu Karamuak, at 2000 feet altitude, on the Tavail Plateau, Sandakan District, Sabah, collected on August 3, 1963, and deposited in the Sandakan herbarium. Thus far, the taxon is known only from the original collection which is in fruit only and was misidentified and distributed as *T. holophyllum* (J. G. Baker) Kosterm. The collector describes the plant as a tree, the clear bole about 8 m. high, 15 cm. in diameter at breast height, the inner bark and sapwood yellowish-ochre, turning brownish after exposure.

Citations: GREATER SUNDA ISLANDS: Sabah: *Meijer SAN.39328* (Sn--40880--type, Z--isotype).

TEIJSMANNIODENDRON UNIFOLIOLATUM (Merr.) Mold., *Phytologia* 4: 58. 1952.

Synonymy: *Vitex unifoliolata* Merr., *Philip. Journ. Sci. Bot.* 20: 438--439. 1922.

Bibliography: E. D. Merr., *Philip. Journ. Sci. Bot.* 20: 438--439. 1922; E. D. Merr., *Enum. Philip. Flow. Pl.* 3: 398. 1923; A. W. Hill, *Ind. Kew. Suppl.* 7: 252. 1929; Fedde & Schust., *Justs Bot. Jahresber.* 53 (1): 1077. 1932; Mold., *Alph. List Comm. Names* 3. 1939; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 63 & 104. 1942; Mold., *Phytologia* 2: 123. 1944; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 142 & 203. 1949; Kosterm., *Reinwardtia* 1: 104 & 106. 1951; Mold., *Phytologia* 4: 58. 1952; Mold., *Résumé* 193 & 470. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 141. 1959; Mold., *Résumé Suppl.* 2: 14. 1960; Mold., *Fifth Summ.* 1: 318 (1971) and 2: 731 & 911. 1971; Mold., *Phytologia* 46: 466. 1980.

A shrub or small tree, glabrous except for the inflorescence; branches somewhat tetragonal, pale-grayish, glabrous, the ultimate ones about 3 mm. in diameter; leaves 1-foliolate; petioles about 1 cm. long, glabrous; leaflet-blades coriaceous, pale-olivaceous when dry, oblong, 20--27 cm. long, 7--10 cm. wide, apically rather slender-acuminate, marginally entire, basally rounded, shiny, more or less bullate above, glabrous on both surfaces, slightly paler and more densely punctulate beneath; secondaries 9--12 per side, prominent on both surfaces, curvate-anastomosing; veinlet reticulation loose, very prominent; inflorescence solitary, terminal, slender, about 40 cm. long; peduncles about 6 cm. long, rather slender, about 2.5 mm. in diameter; primary inflorescence-branches only 1 or 2, greatly elongated, slightly pubescent; individual cymes widely scattered, few-flowered, 3--4 cm. long; calyx cupuliform, about 3 mm. long,

the rim equally 5-lobed, the lobes ovate, about 0.5 mm. long, apically obtuse, appressed-pubescent with short hairs; corolla blue, about 11 mm. long, its tube about 5 mm. long, externally slightly pubescent, the lower lip 3-lobed, with the middle lobe large, orbicular, about 5 mm. in diameter, entire, glabrous, the 2 lateral lobes elliptic, apically rounded, about 3 mm. long, the upper lip about 2 mm. long; stamens somewhat exserted, basally villous; young fruit glabrous or nearly so, enclosed by the accrescent fruiting-calyx.

This species is based on *Ramos & Edaña s.n.* [Philip. Bur. Sci. 37048] from forests along streams at low altitude at Malangas, Zamboanga District, Mindanao, Philippine Islands, collected on October 27, 1919, and deposited in the herbarium of the Philippine Bureau of Science in Manila, now most probably destroyed.

A vernacular name recorded for the species is "babaka" and Merrill (1922) points out that *T. unifoliolatum* is very similar in habit to what is now known as *T. hollrungii* (Warb.) Kosterm., from which it differs in its very slender inflorescences, details of the corolla (such as the middle lobe of the lower lip being orbicular, marginally entire, and glabrous), and in its glabrous (not tawny-pubescent) fruits. Kostermans (1951) was of the opinion that the 2 taxa are "likely to be conspecific", basing his belief on the "densely punctilate [sic!] lower leaf-surface" of both. The collection cited below he tentatively identified as *T. sarawakanum*, apparently at the time not having seen any authentic material of either Merrill's or Pearson's species. Merrill's description states that the leaflets of his plant are basally rounded, as they are in the collection cited below, while the material cited by Kostermans, exclusive of this collection, has the leaflets basally acute. I am rather sure, therefore, that this collection represents Merrill's species.

Citations: GREATER SUNDA ISLANDS: Sarawak: *Clemens & Clemens* 21826 [field no. 6529] (Bz--73096, N, N--photo, Z--photo).

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ADDITIONAL NOTES ON THE GENUS *AEGIPHILA*. XXVIII

Harold N. Moldenke

AEGIPHILA Jacq.

Additional bibliography: Arechav., Anal. Mus. Nac. Montev. 4: 62. 1903; Fournet, Fl. illust. Phan. Guad. Mart. 1391 & 1410--1412, fig. 672. 1978; Hocking, Excerpt. Bot. A.33: 88 & 89. 1979; Mold., Phytologia 46: 288, 317--337, & 504. 1980; Mold. & Bromley in Harley & May, Towards Checklist Fl. Bahia 188. 1980.

AEGIPHILA ALBA Mold.

Additional bibliography: Hocking, Excerpt. Bot. A.33: 88 & 89. 1979; Mold., Phytologia 46: 318--319. 1980.